

Atmospheric Lifetimes for N₂O and CF₂Cl₂ Inferred From CLAES and MLS Measurements

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The nearly complete coverage between 34 S and 34 N of the CLAES instrument for N₂O and CF₂Cl₂ between roughly 100 and 0.5 mb during 1992 can be used to infer the annually averaged total atmospheric loss rate for these source gases. The photolytic loss frequencies are calculated from MLS O₃ profiles using a two-stream radiative transfer model with a spherical atmosphere treatment of the direct solar beam. Exoatmospheric solar fluxes are taken from WMO (1985). The small loss contribution from reaction with O(¹D) is estimated using a modelled zonal average O(¹D) field. Zonal average species distributions are formed by binning data into monthly means. The CLAES investigator's observation that the CF₂Cl₂ data implied a shorter total atmospheric lifetime than currently estimated is supported by the complete calculation. The inferred N₂O lifetime in reference to CF₂Cl₂ appears somewhat longer than current estimates. The uncertainties in the inferred lifetimes and the implications for budgets and projections will be discussed.

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